ORIGINAL

BEFORE THE
POSTAL RATE COMMISSION
WASHINGTON, D.C. 20268-0001

Postal Rate and Fee Changes, 1997) Docket No. R97-1

OFFICE OF THE CONSUMER ADVOCATE
RESPONSE TO NOTICE OF INQUIRY NO. 4
ON MAIL PROCESSING VARIABILITY
(February 6, 1998)

In its Notice of Inquiry No. 4 (NOI) issued January 16, 1998, the Commission asked for comments on whether a restriction contained in the model proposed by witness Bradley is statistically supported. Specifically, the Commission stated, "Visual inspection of the plots of individual facility data presented in OCA-LR-9 suggests that regression lines fit through them, using the model specification proposed by witness Bradley, would produce slope coefficients that are statistically different."[1]

I. INTRODUCTION

The Commission has asked the parties to evaluate whether witness Bradley's assumption that the slope coefficients for the beta sub i for the variable TPH are equal from site to site as hypothesized by witness Bradley. The OCA has previously filed testimony that the underlying data do not appear, based on visual inspection, to substantiate witness Bradley's assumption:

[1] NOI at 3.

- First, based on observation of the data plots, it appeared that the slopes of the beta sub i for regression lines which could be generated on an individual site-by-site basis would be different from each other; in contrast, witness Bradley assumed as a basis for his fixed effects model that such slopes would be identical on an individual site basis. The conclusions, presented in the testimony of OCA witness Smith (OCA-T-400) were based on plots of four activities: Manual Letters (MANL), Manual Flats (MANF), Letter Sorting Machine (LSM), and Optical Character Reader (OCR).
- Second, in the case of a number of sites, the data were more of the form of a "Blob" than in the form of a meaningful trend for which a regression line would be meaningful.

Witness Smith also noted that the use of the fixed effects approach is inappropriate. Whether or not the beta sub i are equal, the beta sub i for the TPH variable measure short-run responses. A longer-run approach focused on the time period in which the rates would be in effect is necessary. The OCA has analyzed the four cases. The tables below together with supporting documentation on the computer disks filed with this response present a statistical analysis supporting the conclusion that the beta sub i for TPH are not all identical from site to site.

II. DEVELOPMENT OF THE ANALYSIS

SAS programs utilizing the PROC REG procedure on the data sets developed by witness Bradley for the four activities were run. The regressions were run based on non-log, non-mean centered data. Accordingly, the beta sub i for the TPH variable are not in a form that measures cost elasticity with respect to TPH. Instead, the regressions provide the coefficient for a beta sub i for the TPH variable. The absence of common slopes means that choosing to model a common slope for the fixed effects regressions is inappropriate.

For each of the activities, a separate regression was run for each IDNUM. The equations are of the form:

Hrs = f(TPH, AP02, AP03, AP04, AP05, AP06, AP07, AP08, AP09, AP10, AP11, AP12, AP13).

The modified programs and their corresponding outputs are on the accompanying disks:

- Programs used to generate site specific regressions are in the files: MANLPLG, LSMPLG, OCRPLG, and MANFPLG.
- Outputs from the programs are in the following files: MANLOUT, LSMOUT, OCROUT, AND MANFOUT

Witness Bradley indicated in his response to POIR No. 7 that the running of SAS programs on a site-by site-basis produced meaningless results due to multicollinearity. His analysis raised several questions as to why the equations would be meaningful on an aggregate basis if not on a site-by-site basis, and whether

meaningful results could be found by eliminating some of the variables in his equations. Accordingly, none of the exogenous variables other than those previously delineated were included in the regressions produced by the OCA. As a result, the equations generated focus solely on the relationship between hours and TPH, without the consideration of variables other than the seasonal variables.

III. CONCLUSIONS

The previously filed OCA testimony of OCA witness Smith referenced three separate sites for each of the four activities, based on a visual inspection of the data. The beta sub i for TPH in each of the regressions are summarized for each of the activities in Table 1. The "F distribution" is equal to the square of the "t distribution," and it appears that a simple way of testing whether two beta sub i are equal would be to determine whether they are within a confidence interval of each other, based on "t." In a number of cases the beta sub i are not within confidence intervals of each other at the 1% level of confidence.

An additional analysis was performed on the first twelve regressions in each of the output files. The results are reported in Table 2 for MANL, Table 3 for MANF, Table 4 for LSM, and Table 5 for OCR. A review of the confidence intervals in the tables indicated that a number of the beta sub i are uniquely different from every other beta sub i in the respective tables; that is, their confidence intervals do not contain the other beta sub i. These cases are denoted by "XXXX." A further review of the output for each of the four activities considered found additional cases of beta sub i being different from each other.

Table 1: Beta sub i by IDNUM

ACTIVITY	IDNUM	RSQD	BETA	STD ERROR	LOW RANGE	HIGH RANGE	"t" VALUE
MANL	8195	0.95	1.560	0.037	1.4638	1.6562	2.60
MANL	3361	0.28	0.304	0.098	0.0365	0.5715	2.73
MANL	242	0.59	0.740	0.086	0.5164	0.9636	2.60
MANF	1374	0.90	1.200	0.043	1.0882	1.3118	2.60
MANF	3593	0.18	-0.199	0.210	-0.7765	0.3785	2.75
MANF	5255	0.73	1.410	0.100	1.1440	1.6760	2.66
LSM	7346	0.88	0.630	0.023	0.5702	0.6898	2.60
LSM	4347	0.01	0.050	0.064	-0.1215	0.2215	2.68
LSM	2375	0.90	0.660	0.030	0.5790	0.7410	2.70
OCR	9961	0.58	0.149	0.014	0.1118	0.1862	2.66
OCR	2467	0.05	-0.160	0.060	-0.3220	0.0020	2.70
OCR	8195	0.88	0.120	0.004	0.1096	0.1304	2.60

Table 2: Analysis of MANL Activities for 12 Sites

SITE	BETA FOR TPH	STD ERROR	LOW RANGE	HIGH RANGE		"t" VALUE
19	0.560	0.120	0.22880	0.89120	XXXX	2.76
26	-0.300	0.669	-2.12637	1.52637		2.73
104	1.800	0.160	1.37440	2.22560	XXXX	2.66
120	1.010	0.054	0.86852	1.15148		2.62
164	-0.270	0.388	-1.35252	0.81252		2.79
242	0.750	0.086	0.52468	0.97532		2.62
341	1.560	0.179	1.06059	2.05941		2.79
401	0.277	0.116	-0.03156	0.58556		2.66
415	0.930	0.085	0.70730	1.15270		2.62
503	1.970	0.150	1.57700	2.36300		2.62
523	-0.610	0.170	-1.07410	-0.14590	XXXX	2.73
614	1.800	0.077	1.59518	2.00482		2.66

Table 3: Analysis of MANF Activities for 12 Sites

SITE	BETA FOR TPH	STD ERROR	LOW RANGE	HIGH RANGE		"t" VALUE
26	0.855	0.3860	-0.19492	1.90492		2.72
104	1.380	0.1765	0.91051	1.84949		2.66
120	1.354	0.1198	1.04012	1.66787		2.62
164	0.380	0.1540	-0.02964	0.78964	XXXX	2.66
242	0.508	0.1250	0.18050	0.83550		2.62
336	0.814	0.1970	0.26240	1.36560		2.80
341	1.600	0.0800	1.38720	1.81280	XXXX	2.66
401	2.000	0.2200	1.41480	2.58520		2.66
415	1.410	0.1000	1.14800	1.67200		2.62
503	1.110	0.0380	1.01044	1.20956	XXXX	2.62
507	5.010	1.5000	0.79500	9.22500		2.81
523	1.950	0.1300	1.59640	2.30360		2.72

Table 4: Analysis of LSM Activities for 12 Sites

SITE	BETA FOR TPH	STD ERROR	LOW RANGE	HIGH RANGE		"t" VALUE
104	0.674	0.0165	0.63011	0.71789	XXXX	2.66
120	0.605	0.0033	0.59632	0.61367	XXXX	2.63
164	0.755	0.0272	0.68265	0.82735		2.66
242	0.530	0.0060	0.51428	0.54572	XXXX	2.62
341	0.550	0.0123	0.51728	0.58271		2.66
401	0.636	0.0180	0.58812	0.68388		2.66
415	0.730	0.0170	0.68410	0.77590	XXXX	2.70
503	0.388	0.0145	0.35001	0.42599	XXXX	2.62
614	0.538	0.0250	0.47125	0.60475		2.67
621	0.544	0.0070	0.52552	0.56248		2.64
659	0.554	0.0210	0.49814	0.60986		2.66
686	0.593	0.0050	0.57990	0.60610		2.62

Table 5: Analysis of OCR Activities for 12 Sites

SITE	BETA FOR TPH	STD ERROR	LOW RANGE	HIGH RANGE		"t" VALUE
19	-0.110	0.0600	-0.27536	0.05536	XXXX	2.756
104	0.030	0.0200	-0.02320	0.08320		2.660
120	0.090	0.0060	0.07422	0.10578	XXXX	2.630
164	0.600	0.0400	0.49400	0.70600	XXXX	2.650
242	0.210	0.0070	0.19159	0.22841	XXXX	2.630
341	0.050	0.0090	0.02606	0.07394	XXXX	2.660
401	0.080	0.0140	0.04276	0.11724		2.660
415	0.190	0.0120	0.15844	0.22156		2.630
503	0.160	0.0110	0.13107	0.18893	XXXX	2.630
614	0.137	0.0165	0.09311	0.18089		2.660
621	0.138	0.0070	0.11959	0.15641		2.630
686	0.164	0.0080	0.14296	0.18504		2.630

The first twelve regressions for each of the four activities were reviewed, and there were cases in which the slopes were statistically different between sites. A visual inspection of the hundreds of additional regressions per activity suggests that additional cases of different beta sub i would be found. Accordingly, for the four mail processing activities under consideration, witness Bradley's assumption of common beta sub i is not statistically confirmed for a 99 percent confidence interval. Additional analysis and possibly a different approach should be explored.

Respectfully submitted,

Kenneth E. Richardson

Kenneth E. Richardson
Attorney

CERTIFICATE OF SERVICE

I hereby certify that I have this date served the foregoing document upon all participants of record in this proceeding in accordance with section 12 of the rules of practice.

Kenneth E. Richardson

KENNETH E. RICHARDSON
Attorney

Washington, D.C. 20268-0001
February 6, 1998